## REMARKS

Claim 43 is supported in the original claims, in particular, claims 5 and 6.

The claims objected to as being substantial duplicates of other claims have been canceled.

The claims remaining in the application are claims 24, 26, 30, 31, 34, 41 and 43.

All of the claims previously in the application have been rejected under 35 USC § 103 as being unpatentable over newly cited references. Claims 24, 31, 32 and 39-41 were rejected over Fischer et al., US 5,747,568 (Fischer), in view of Reinders et al., WO 96/09928 (Reinders). Claims 24, 31, 32, 34 and 39-41 were rejected over Fischer in view of Ellison et al., US 5,985,079 (Ellison). Claims 24, 31, 23 and 39-41 were rejected over Rosenau et al., US 5,821,302 (Rosenau) in view of Ellison. Claims 24, 31, 32, 39 and 40 were rejected over Rosenau in view of Trabert et al., US 5,318,737 (Trabert). Claims 24, 31, 32, 39-41 were rejected over Rosenau in view of Endoh, EP 006 421 (Endoh). Claims 24, 31, 32 and 39-41 were rejected over Fischer in view of Reinders, Fischer in view of Ellison or Rosenau in view of Ellison, Trabert or Endoh, or Fischer in view of Endoh, all taken together with Tsai et al., US 5,858,550 (Tsai). Claims 26 and 40 were rejected over Fischer in view of Reinders, Ellison or Endoh, and Rosenau in view of Ellison, Trabert or Endoh. These rejections are all traversed.

The remaining claims are drawn to laminated sheets or films which are (co)extruded having an ASA or ASA/polycarbonate substrate-layer and a transparent top layer of polymethyl methacrylate or a styrene-acrylonitrile copolymer. Between those two layers may be located an interlayer of specified composition. Claim 41 also requires a "transport protection film" over the layer which would otherwise be the "top" layer. These laminated sheets or films are usually employed for forming moldings,

especially in the form of an automotive exterior body work component. For producing these moldings the laminated sheets or films are first thermoformed and then backmolded or back-cast with a polymer material forming the major part of the molding. This material is usually ASA, ASA/polycarbonate blend or a polyurethane foam. The laminated sheets or films according to the present invention help to provide a surface finish of the moldings which is superior to painted moldings. In contrast to a painting process, no wet paint has to be applied to the molding.

The specific combination of ASA or ASA/polycarbonate substrate layer and PMMA top layer leads to specific advantages of the claimed laminated sheets or films. The advantages, especially in relation to moldings in which an ABS substrate-layer is used are listed on pages 31 and 32 of the present specification. Examples are:

- lower loss in toughness due to PMMA top layer when the ASA or ASA/polycarbonate substrate-layer is used, in comparison to the ABS substrate;
- increased scratch resistance of the PMMA layer, which is also governed by the substrate layer lying below the top layer;
- effective prevention of the formation of cracks in the PMMA top layer as a result of the toughened interlayer and/or toughened substrate layer, even after heat aging;
- thinner PMMA top layers can be used without reducing the UV-stability of the substrate layer, even after high degree of deep drawing;
- the moldings have very good properties in respect of low-temperature impacts, elongation at break, scratch resistance and surface gloss;
- the laminated sheets or films can be thermoformed with retention of gloss even at very high draw ratios (especially in the positive thermoforming process) after artificial weathering;
- moldings comprising polycarbonates in the substrate layer are highly resistant to

thermal deformation and are particularly impact-resistant.

The use of the ASA or ASA/PC substrate layer in combination with a PMMA top layer leads to the specific advantages of the present invention. This is evident from the comparative data in the working examples of the present specification.

The results listed in table 1 show the change in the penetration energy as a result of PMMA layers. A substrate is coated on one side with a PMMA layer and the penetration energy is measured for the top face and the rear face. For systems including PMMA and ASA substrates the penetration energy for the top face is much higher than the penetration energy for the rear face. On the contrary, for the system PMMA/ABS the penetration energy is rather the same. Among others, the present invention is based on the surprising finding that exchanging an ABS substrate for an ASA substrate leads to this increase in penetration energy. This unexpected result could not be predicted from any of the references discussed below.

Furthermore, the low-temperature impact strength is much higher for PMMA/ASA systems compared to PMMA/ABS-systems, see the results in table 2. The provision of an interlayer furthermore increases the penetration energy to a large extent.

Similar results are obtained for the elongation at break, see table 3. The values obtained form PMMA/ASA/ASA-polycarbonate blends are twice the values obtained for PMMA/ABS.

The films according to the present claims have a significantly higher deepdraw ratio compared to known films of PMMA/ABS. In addition, the laminated sheets or films according to the present invention show a good scratch resistance which is much higher than the scratch resistance of a PVDF film, see table 4 on page 37. Furthermore, the surface gloss after weathering is improved by employing the PMMA/ASA-sheets in comparison to PMMA without ASA and in comparison to ABS and ASA alone. While the surface gloss of the PMMA/ASA-sheet is lower than the

surface gloss of the PMMA alone in the unweathered condition, the situation is reversed after 500 hours of weathering, see the results of table 5, pages 37-38 of the specification.

The prior art cited by the examiner can be divided into prior art relating to ASA molding compositions and prior art relating to films having a PMMA top layer and sometimes an ABS substrate layer. However, none of the references indicates or suggests to obtain the improved mechanical properties as listed above. Even if there were a suggestion to replace an ABS substrate by an ASA substrate, which there is not, there is nothing to suggest that the advantageous properties observed according to the present invention could be achieved. These unexpected results when using ASA substrate layers instead of ABS substrate layers are evidence of unobvious that would have far outweighed any evidence of obviousness that could have been adduced from the combined references.

In other words, even if from the prior art references a person skilled in the art would have been led to exchange ABS and ASA as a substrate material, the results obtained would have been unexpected, of not startling. It was not obvious to exchange the both substrate components with a reasonable expectation of success in order to increase the penetration energy for the top face of the laminated sheets or films, increase the low-temperature impact strength and improve elongation at break, i.e., the "invention as a whole" was clearly unobvious over the combined teachings of the prior art references. *In re Antonie*, 559 F.2d 618, 620, 195 USPQ 6, 8 (CCPA 1977).

The prior art references are analyzed as follows.

References relating to ASA polymers

Fischer relates to a thermoplastic molding material consisting of an alkyl acrylate grafting base, a SAN-graft, a SAN-matrix and tocopherol and thiodipropionic esters as additives. It is disclosed that this material may be used for forming automotive parts.

However, there is no suggestion that this material may be formed into laminated sheets having a PMMA top layer. Fischer relates to the use of the described ASA polymer for forming the bulk material of automotive parts and not a laminated sheet or film which will be used in connection with backspraying or back-casting with an ASA polymer or in connection with laminating the laminated sheet or film onto a molding of this ASA polymer.

The problem underlying the Fischer reference is to stabilize graft rubbers, in particular to increase the heat-aging resistance, see col. 1, lines 40-41. Thus, the problem underlying Fischer is totally different from the problem underlying the present invention.

Rosenau relates to shaped articles comprising thermoplastic molding materials. The thermoplastic molding materials contain a thermoplastic styrene polymer, a graft polymer and a particulate polymer as a dulling agent. The thermoplastic styrene polymer may be a styrene/acrylonitrile copolymer. The graft polymer may be an ASA polymer, see the examples. As the dulling agent, an ABS graft copolymer can be employed, see col. 12,

It is disclosed that the molding materials may be employed in automotive construction, see col. 2, line 16. However, there is no disclosure to employ the molding materials in laminated sheets or films in order to obtain the advantageous properties discussed above.

The problem underlying the Rosenau reference is to provide shaped articles which are weather-resistant and have a dull surface and furthermore have high impact strength, see column 3, line 21 to 23. Thus, the problem and solution according to Rosenau are significantly different from the problem and solution according to the present invention.

References relating to PMMA sheets:

Ellison relates to a flexible composite surfacing film and method for producing it. The surfacing film is disposed on a flexible temporary carrier film. To this temporary carrier film a transparent film is bonded, which itself is adjacent to a pigmented layer which may be adjacent to a backing layer, see figure 4. The transparent layer may be PMMA, see column 6, line 28. This transparent film (11) may be formed with different layers of differing properties. It is stated that the polymers may be co-extruded to form the laminated films, see column 7, lines 39 to 40, column 8, lines 35 to 36. The laminated surfacing film may be employed in automobile body applications and exterior automobile body parts, see column 8, lines 63 to 64 and column 11, lines 36 to 37. There is no suggestion to employ an ASA substrate layer.

The problem underlying Ellison is to provide an improved manufacturing method for manufacturing surfacing films, see column 2, lines 15 to 18. The specific advantages of the Ellison method relate to the production process involving the temporary carrier film.

Reinders relates to a cover foil with a heat-activated layer. This cover foil is intended for adhesion to an optionally information-carrying surface which can have letters or pictures thereon. The cover foil is especially intended to be used for laminating sheets (e.g. of paper) containing writings or pictures. The laminating cover foil may contain a PMMA first layer, a ABS carrier layer and a third melt glue layer. The cover foil may be prepared by co-extrusion, see the abstract.

There is no mention or suggestion of an ASA carrier layer.

The problem underlying the Reinders reference is to provide a cover foil which offers a combination of a first layer provided with the structure and a heat activated glue layer, see page 1, lines 7 and 10. Thus, the problem underlying Reinders is totally different from the problem underlying the present invention.

Trabert relates to a feedblock co-extrusion of modified acrylic capstock. Among others the reference relates to sheets or films including PMMA covered ABS, polycarbonate and polycarbonate/ABS-sheets. The sheets can be prepared by co-extrusion techniques, see column 5, lines 28 to 38 and 49 to 52. It is stated that the PMMA top layer does not adversely affect the mechanical properties of the composite, see column 1, lines 50 to 51. It is stated that a sheet of the composite can be thermoformed into an article, see column 1, page 68 to column 2, line 2. Automotive applications are listed in column 10, lines 21 et seq. the capstock according to Trabert provides resistance to chemicals and reduces the haze in thermoforming, improves the scratch resistance and toughness see column 5, lines 39 to 47. However, there is no mention or suggestion of an ASA substrate and the advantages connected with using an ASA substrate.

Endoh relates to an extrusion laminated product. The extrusion laminated product comprises at least three layers wherein at least one of the surface layers comprises polyvinylidene fluoride, and an adhesive layer which is provided between the surface layer and other thermoplastic resin layers comprises a polymer comprising at least one of methylmethacrylate and ethyl methacrylate as a major component and an UV-absorber. The laminated sheets or films may be prepared by coextrusion . see page 2, first line, and page 12, line 17. Specifically disclosed are laminated sheets or films having a PVF top layer, a PMMA interlayer and a substrate layer made of ABS, PVC, PC or others. The object of Endoh is to provide a laminated product having a polyvinylidene fluoride film as at least one surface layer, which can maintain a good surface state even after being exposed to atmospheric conditions for a long period of time and at the same time, is at least substantially free from deterioration by ultraviolet rays, see page 5, line 11 to 17. Thus, the problem and solution underlying the present invention are totally different from the problem and solution underlying the Endoh

reference. According to the present invention a PMMA top layer is employed, whereas according to Endoh a PVF top layer is employed.

Since none of the references discloses or suggests the advantages obtained by the combination of a PMMA top layer and an ASA substrate layer according to the present invention, the combination of references cannot lead to the here claimed invention, if at all, without the use of impermissible hindsight, dissection of the references and reassembling the bits and pieces thereof so obtained. It has long been held that such a procedure in formulating a rejection under 35 USC § 103 is completely improper. See, merely for example, *Akzo N.V. v. U.S. International Trade Commission,* 808 F.2d 1471, 1480-81, 1 USPQ2d 1241, 1246 (Fed. Cir. 1986), *cert. denied*, 482 U.S. 909 (1987) and *Loctite Corp. v. Ultraseal Ltd.,* 781 F.2d 861, 874, 228 USPQ 90, 99 (Fed. Cir. 1985). See also MPEP § 2142, second paragraph.

A second embodiment of the present invention (particularly in claim 43) relates to a laminated sheet or film having an ASA or ASA/PC substrate layer, a styrene-acrylonitrile copolymer (SAN) top layer and optionally a styrene-acrylonitrile copolymer (SAN) inter layer.

The present inventors found that a top layer of styrene-acrylonitrile copolymer leads to a high gloss and a high scratch resistance of the laminated sheets or films. The present inventors carried out the following additional experiments:

The first laminated sheet or film consisted of 950 µm of ASA which was colored and 50 µm SAN top layer. A second laminated sheet or film consisted of 750 µm ASA which was colored, an inter layer of 200 µm SAN which was colored with effect colorants, and 50 µm SAN top layer.

These products could be co-extruded to laminated sheets or films at a temperature of 230°C without any problems. The gloss of these laminated sheets or films was significantly higher even than a corresponding laminated sheet or film having

a PMMA top layer. The gloss at 20°C was 99 for the laminated sheet or film containing the SAN top layer, whereas for a PMMA top layer the value was only 79. For an angle of 60°C the gloss was 100 for the SAN top layer and only 87 for the PMMA top layer.

Furthermore, the scratch resistance is improved even further over PMMA top layers. To show this the sheets were tested with the AMTEC-Kistler-test which is usually employed in the automobile industry. In this test the black test moldings were treated ten times with a brush and an aqueous washing detergent mixture containing 1.5 g/L sand. The gloss was determined before and after the treatment under an angle of 20°.

Before starting the treatment, the gloss for the sheet or film with a SAN top layer was 99, whereas for the sheet with a PMMA top layer it was only 79. After the treatment according to the AMTEC-Kistler-test, the gloss was 34 for the SAN top layer and only 9 for the PMMA top layer.

Thus, the embodiment in which laminated sheets or films contain a SAN top layer included in some claims and to which claim 43 is specifically limited, shows an improved gloss and scratch resistance even when compared with the PMMA top layer. These laminated sheets or films containing the SAN top layer are not disclosed in any of the prior art references. Thus, the foregoing comments apply even more forcefully to those claims.

In light of the foregoing amendment and remarks, it is believed that all of the rejections of record have been obviated and allowance of this application is respectfully requested.

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Respectfully submitted,
KEIL & WEINKAUF

Melvin Goldstein
Reg. No. 41,560

1350 Connecticut Ave., N.W.
Washington, D.C. 20036
(202)659-0100
MG/kas

***VERSION WITH MARKINGS TO SHOW CHANGES MADE***

Cancel claims 32, 39, 40 and 42.

Add new claim 43 as follows:

43. (new) A laminated sheet or film comprising the following (co)extruded layers:

a substrate layer comprising - based on the sum of the amounts of the following components A and B and, if used, C and/or D, which totals 100% by weight -

1 - 99% by weight component A, which is of a graft copolymer of

1 - 99% by weight of a particulate graft base A1 comprising the following monomers:

80 - 99.99% by weight of at least one $C_{1-8}$-alkyl ester of acrylic acid as component A11;

0.01 -20% by weight of at least one polyfunctional crosslinking monomer as component A12;

1 - 99% by weight of a graft A2 comprising the following monomers, based on A2:

40 - 100% by weight of units of styrene, a substituted styrene or a (meth)acrylate, or mixtures thereof, as component A21 and

up to 60% by weight of units of acrylonitrile or methacrylonitrile as component A22;

the graft A2 comprising at least one graft shell and the graft copolymer having a mean particle size of 50 - 1000 nm;

1 - 99% by weight of component B, which is a copolymer of

40 - 100% by weight of units of styrene, a substituted styrene or a (meth)acrylate, or mixtures thereof, as component B1, and

up to 60% by weight of acrylonitrile or methacrylonitrile as component B2;

0 - 80% by weight of component C, which is a polycarbonate; and

0 - 50% by weight of component D, which is a fibrous or particulate filler or mixtures thereof;

a transparent top layer of a styrene-acrylonitrile copolymer,

and optionally,

between the top layer and the substrate layer,

an (co)extruded interlayer of a styrene-acrylonitrile copolymer.

***FULL SET OF CLAIMS***

24. A laminated sheet or film comprising the following (co)extruded layers:

a substrate layer comprising - based on the sum of the amounts of the following components A and B and, if used, C and/or D, which totals 100% by weight -

1 - 99% by weight component A, which is of a graft copolymer of

1 - 99% by weight of a particulate graft base A1 comprising the following monomers:

80 - 99.99% by weight of at least one $C_{1-8}$-alkyl ester of acrylic acid as component A11;

0.01 -20% by weight of at least one polyfunctional crosslinking monomer as component A12;

1 - 99% by weight of a graft A2 comprising the following monomers, based on A2:

40 - 100% by weight of units of styrene, a substituted styrene or a (meth)acrylate, or mixtures thereof, as component A21 and

up to 60% by weight of units of acrylonitrile or methacrylonitrile as component A22;

the graft A2 comprising at least one graft shell and the graft copolymer having a mean particle size of 50 - 1000 nm;

1 - 99% by weight of component B, which is a copolymer of

40 - 100% by weight of units of styrene, a substituted styrene or a (meth)acrylate, or mixtures thereof, as component B1, and

up to 60% by weight of acrylonitrile or methacrylonitrile as component B2;

0 - 80% by weight of component C, which is a polycarbonate; and

0 - 50% by weight of component D, which is a fibrous or particulate filler or mixtures thereof;

a transparent top layer of polymethyl methacrylate

and optionally,

between the top layer and the substrate layer,

an (co)extruded interlayer of impact-modified polymethyl methacrylate, polycarbonate or a molding composition of said substrate layer without polycarbonate, if said substrate layer contains polycarbonate.

26. A laminated sheet or film as defined in claim 24, having an overall thickness of from 100 µm to 10 mm.

30. A laminated sheet or film as defined in claim 24, wherein the ratio of the MFI values of the individual components of the laminated sheet or film is not more than 3:1.

31. A molding comprising a shaped laminated sheet as defined in claim 24.

34. A molding as defined in claim 31 in the form of an automotive exterior bodywork component.

41. A laminated sheet or film comprising the following (co)extruded layers:

a substrate layer comprising - based on the sum of the amounts of the following components A and B and, if used, C and/or D, which totals 100% by weight -

1 - 99% by weight component A, which is of a graft copolymer of

1 - 99% by weight of a particulate graft base A1 comprising the following monomers:

80 - 99.99% by weight of at least one $C_{1-8}$-alkyl ester of acrylic acid as component A11;

0.01 -20% by weight of at least one polyfunctional crosslinking monomer as component A12;

1 - 99% by weight of a graft A2 comprising the following monomers, based on A2:

40 - 100% by weight of units of styrene, a substituted styrene or a (meth)acrylate, or mixtures thereof, as component A21 and

up to 60% by weight of units of acrylonitrile or methacrylonitrile as component A22;

the graft A2 comprising at least one graft shell and the graft copolymer having a mean particle size of 50 - 1000 nm;

1 - 99% by weight of component B, which is a copolymer of

40 - 100% by weight of units of styrene, a substituted styrene or a (meth)acrylate, or mixtures thereof, as component B1, and

up to 60% by weight of acrylonitrile or methacrylonitrile as component B2;

0 - 80% by weight of component C, which is a polycarbonate; and

0 - 50% by weight of component D, which is a fibrous or particulate filler or

mixtures thereof;

a transparent layer of polymethyl methacrylate and a transport protection film applied to the outside of said layer of polymethyl methacrylate.

43. A laminated sheet or film comprising the following (co)extruded layers:

a substrate layer comprising - based on the sum of the amounts of the following components A and B and, if used, C and/or D, which totals 100% by weight -

1 - 99% by weight component A, which is of a graft copolymer of

1 - 99% by weight of a particulate graft base A1 comprising the following monomers:

80 - 99.99% by weight of at least one $C_{1-8}$-alkyl ester of acrylic acid as component A11;

0.01 -20% by weight of at least one polyfunctional crosslinking monomer as component A12;

1 - 99% by weight of a graft A2 comprising the following monomers, based on A2:

40 - 100% by weight of units of styrene, a substituted styrene or a (meth)acrylate, or mixtures thereof, as component A21 and

up to 60% by weight of units of acrylonitrile or methacrylonitrile as component A22;

the graft A2 comprising at least one graft shell and the graft copolymer having a mean particle size of 50 - 1000 nm;

1 - 99% by weight of component B, which is a copolymer of

40 - 100% by weight of units of styrene, a substituted styrene or a (meth)acrylate, or mixtures thereof, as component B1, and

up to 60% by weight of acrylonitrile or methacrylonitrile as component B2;

0 - 80% by weight of component C, which is a polycarbonate; and

0 - 50% by weight of component D, which is a fibrous or particulate filler or mixtures thereof;

a transparent top layer of a styrene-acrylonitrile copolymer,

and optionally,

between the top layer and the substrate layer,

an (co)extruded interlayer of a styrene-acrylonitrile copolymer.